CLAIMS

1. A method of determining resistance in a fuel cell, including the steps of:

(A) measuring an initial stack current and stack voltage;

(B) changing fuel cell stack load across the fuel cell;

(C) substantially immediately reading the output voltage and current of the fuel cell; and

(D) calculating the resistance of the fuel cell.

2. The method of determining resistance in a fuel cell, as defined in claim 1, including the further steps of:

(A) coupling constant current with the fuel cell to set stack current;

(B) waiting a predetermined time period for the output voltage of the fuel cell to stabilize;

(C) measuring the output voltage of the fuel cell;

(D) changing the fuel cell current;

(E) substantially immediately reading the output voltage of the fuel cell; and

(F) calculating the resistance of the fuel cell.

3. The method of determining resistance, as defined in claim 2 including the further step of

evaluating any changes in said calculated resistance over time as a measure of fuel cell hydration.

4. The method of determining resistance in a fuel cell, as defined in claim 1, including the further steps of:

(A) switching a fixed resistance load onto said fuel cell;

(B) allowing the fuel cell stack voltage to stabilize at a first voltage level;

(C) removing the fixed resistance;

(D) substantially immediately measuring the new stack voltage; and

(E) calculating the fuel cell resistance based upon the change between the first voltage level and the new stack voltage.

5. The method of determining resistance as defined in claim 1 including the further steps of:

(A) providing a DC-DC converter with an associated microcontroller;

(B) adjusting input parameters of said DC-DC converter, using said microcontroller, to establish an initial duty cycle;

(C) reading the stack voltage and the stack current;

(D) charging the duty cycle;

(E) substantially immediately measuring the fuel cell voltage and fuel cell current; and

(F) calculating resistance based upon measurements.

6. The method of determining resistance, as defined in claim 1 including the further step of

evaluating any changes in resistance over time as a measure of fuel cell hydration.

7. The method of determining resistance, as defined in claim 1, wherein said fuel cell comprises one of the following:

(A) a fuel cell stack;

(B) a fuel cell array; and

(C) an individual fuel cell.

8. The method of determining resistance, as defined in claim 3, wherein a fuel cell in said fuel cell stack, said fuel cell array, or said individual fuel cell is a direct oxidation fuel cell.

9. The method of determining resistance, as defined in claim 4, wherein said direct oxidation fuel cell is a direct methanol fuel cell.

10. The method of determining resistance, as defined in claim 3, wherein a fuel cell in said fuel cell stack, said fuel cell array, or said individual fuel cell is a hydrogen fuel cell.

11. A system of measuring resistance of a fuel cell means, comprising:

(A) a fuel cell means which generates an output voltage and an output current;

(B) a fixed load circuit connected in parallel with said fuel cell means responsive to a control signal for switching said fixed load circuit across said fuel cell means; and

(C) a measuring device coupled to said fuel cell that measures desired parameters related to the resistance across the fuel cell means.

12. The system as in claim 11 wherein said fuel cell means is a direct oxidation fuel cell stack.

13 The system as in claim 11 wherein said fuel cell means is a direct oxidation fuel cell array.

14. The system as in claim 11 further comprising a DC-DC converter circuit having input that is connected to receive the output voltage from said fuel cell means and being responsive to said control signal for varying the opening and closing of switches within said DC-DC converter such that a load is switched on and off said fuel cell means and said measuring device has means for measuring the resistance of the fuel cell means, when said switches are turned on, and when turned off.

15. A method of measuring resistance in a fuel cell stack being used as a power source, comprising the steps of:

(A) using a fuel cell stack to produce power that can be supplied to a battery or load;

(B) switching a fixed load across said fuel cell stack;

(C) reading the voltage across the stack after a predetermined time period when said fixed load circuit is on;

(D) turning off the load;

(E) substantially immediately reading the stack voltage; and

(F) determining stack resistance based upon a change in said stack voltage readings.

16. A method of measuring resistance across a direct oxidation fuel cell stack that includes programmable DC-DC switches including the steps of:

(A) using said programmable DC-DC switches to switch a load on and off said fuel cell stack;

(B) signaling an associated microprocessor under pulse-width modulation control to adjust the duty cycle of said DC-DC switches

(C) measuring voltage changes as said switches change;

(D) calculating a change in resistance over time; and

(E) predicting cell hydration based upon said changes.